The Study of Prevalence and Associated Factors of Dementia in the Elderly

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ABSTRACT

Objective: To study the prevalence and related factors of dementia in elderly.

Methods: A descriptive study of 295 elderlies was studied in Bangkruai subdistrict, Nonthaburi. According to the definition in Thailand, elderly is people who is older than 60 years old. Tools for this study were MMSE-Thai 2002 for screening dementia and calculating prevalence and general information questionnaires for related factor.

Results: The prevalence of dementia in elderly in Bangkruai subdistrict, Nonthaburi was 18 percent. The related factors of dementia in elderly were male sex, high age, low education, diabetes mellitus, no mobile phone, no computer skill, no internet skill, rarely social participation and rarely religion participation. However, factors that had no statistically significant were weight, height, BMI, marital status, occupation, hypertension, dyslipidemia, daily medicine, alcohol consumption, smoking, coffee, exercise, daily television use and family category.

Conclusion: The prevalence of dementia in elderly was 18 percent and the related factors that have statistically significant were male sex, high age, low education, diabetes mellitus, no mobile phone, no computer skill, no internet skill, rarely social participation and rarely religion participation. The study showed size of problem and made the good plans for elderly health such as technology assessment and motivation for social participation.

Keywords: Dementia; Prevalence; Related factor; Elderly (Siriraj Med J 2021; 73: 224-235)

INTRODUCTION

Currently, the number of senior populations aged 65 years and older is 703 million people which is 9 percent of overall global population.[1] By definition, this conveys that the world is going to enter an aging society. Similarly, there are also a considerable number of senior residents in Thailand, and the number is projected to increase consistently. From population statistics in 2018, the number of elderly residents in Thailand was 10 million, accounting for 16 percent. Hence, Thailand is in a state of entering an aging society, and it will become a complete aging society by 2021. It is expected for Thailand to see the greatest proportion of elderly people in the next 20 years.[2]

Dementia is one of the most common health issues among the elderly. Regarding to the prevalence of dementia in Thailand, there were 600,000 patients with dementia in 2015, and it is expected to surge to 1,117,000 people by 2030 and to 2,007,000 people by 2050.[3] Dementia can result in a loss of both memory and ability in making

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decisions and using language, and it also causes a change in personalities, behaviors and emotions. When dementia progresses and becomes severe, the patients are usually required 24-hour supervision and assistance.[4] As dementia significantly impairs person's memory and skills, this severely affects their abilities in performing daily-routine tasks. According to the report of Thai population's conditions of diseases and injuries (2013), as health problems can affect person's happiness, dementia is stated as one of major causes regarding diseases, which can deprive person's happiness. Dementia ranked the 13th among the male populations as it accounted for 1.7 percent of all diseases, which caused person's loss of happiness. For female counterparts, dementia ranked the 7th, and it made up for 4.6 percent of overall physical causes. In addition, dementia can also affect care providers in many aspects, including their personal time, stress, expenses and so on. These consequences can worsen both of care provider's and patient's quality of life.

According to Health Data Center under the Department of Public Health[5], the number of senior population in Bang Kruai Sub-District, Bang Kruai District, Nonthaburi Province was 6,794 people, and this accounted for 22.5 percent which was higher than the nation's proportion. This area, hence, can be categorized as a complete aging society. While working in a primary medical center, the researcher has been working with a considerable number of the elderly patients. It was found that many of them have a dementia, and some of them can perform their daily-routine tasks normally. Hence, the researcher is interested in identifying the number of patients with a dementia and the associated factors of the disease. The existing issue is that even though the prevalence of dementia is significantly high, the medical service to access the patients is quite passive. There is still a lack in an active study of a primary medical service's level. Due to the limits of commuting, some errors may occur with the use of the passive study. Hence, the researcher is interested in studying the prevalence of dementia in this area as well as associated factors of the disease in a more active manner.

Objective

To study the prevalence and related factors of dementia in elderly.

MATERIALS AND METHODS

Study design and population

This cross-sectional study explored 295 people aged 60 years and older, in Bang Kruai Sub-District, Bang Kruai District, Nonthaburi Province between January and March 2020. The Inclusion Criteria include participant's ability in communicating with Thai language in four skills (speaking, listening, reading and writing) as well as their voluntariness of consent to research. The Exclusion Criteria entail having an impairment regarding seeing or hearing, which can affect participant's ability in performing a test, and having nervous system or mental diseases.

Study size estimation

The previous studies[6-8] showed that average prevalence of dementia is 23.3 percent. Study size estimation by previous prevalence of dementia data was 265, calculated by by the following formula: Elderly Population (N) = 6,749, Error (d) = 0.05, Alpha (α) = 0.05, Z(0.975) = 1.959964 and Prevalence of Dementia Proportion (p) = 0.23. Also, 10% of the average samples are additionally collected to prepare for a case of participant's withdrawal, so the total number of samples in this study was 295.

The formular for calulating sample size of the study

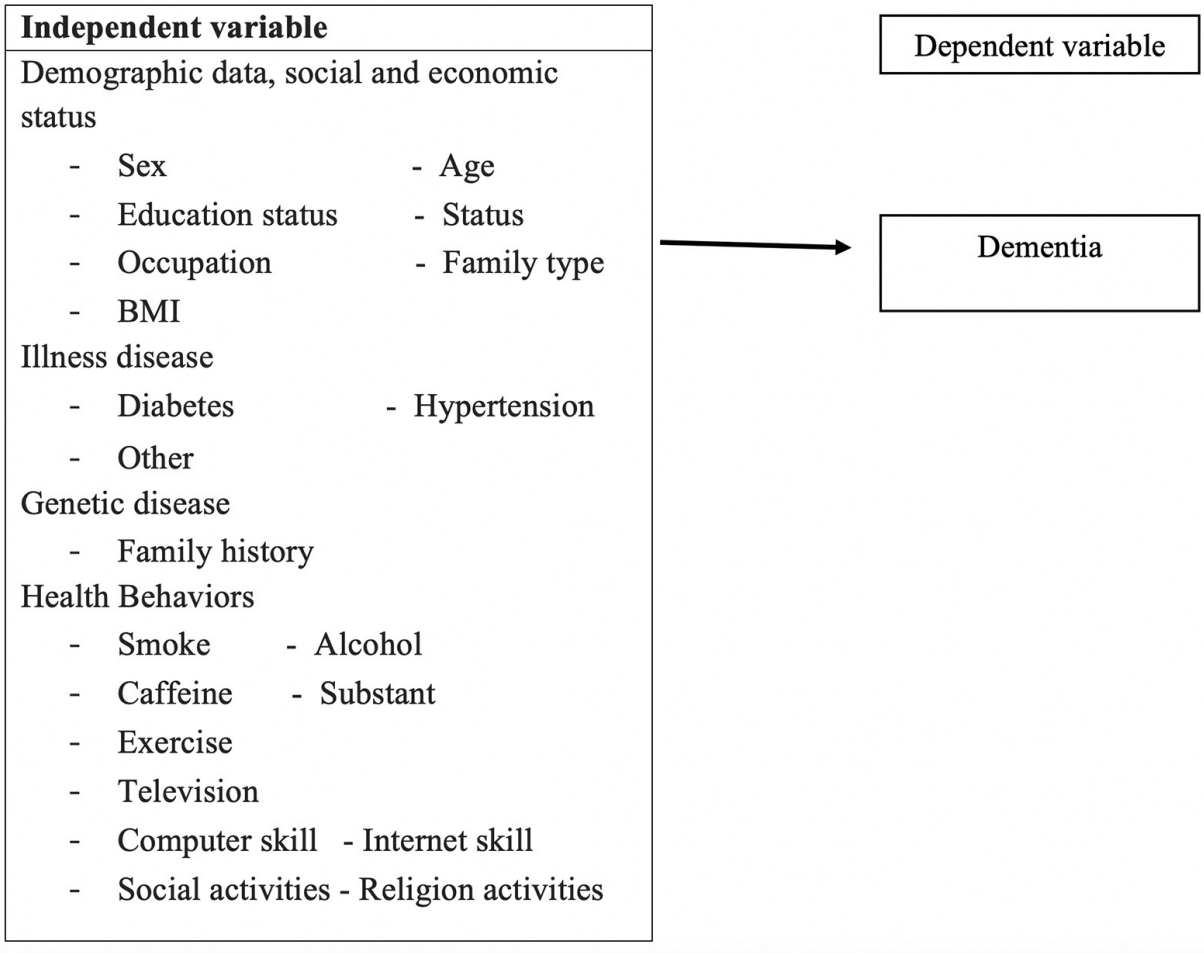
$$n = \frac{Np(1-p)z^2_{1-\frac{\alpha}{2}}}{d^2(N-1)+p(1-p)z^2_{1-\frac{\alpha}{2}}}$$

Measurement and tools

Tools for data collection include MMSE-Thai Questionnaire 2002 and a record of general personal data, covering participant's gender, occupation, marital status, education level, Body Mass Index (BMI), chronic disease and regular medication. A record of general personal data also include a study of participant's habits, such as drinking, smoking, coffee-intake, drug abusing, exercising, TV watching, computer using and internet surfing, as well as their participation in family, social and religious activities. The history of dementia in participant's family is also required for the record.

The diagnosis of dementia was defined by MMSE Score less than 14 in no education group, less than 17 in primary school group and less than 22 in higher primary school group.

Conceptual Framework



Data analysis

Data is analyzed by the statistical software, and the general data are presented in a form of a frequency table and percentage. The analysis of connections between associated factors of dementia is examined by Chi-square test and Fisher's exact test. The study of connections between associated factors of dementia is analyzed by multiple logistic regressions, and the free influences of each variable are examined by calculating crude and adjusted Odd Ratio.

Right to protection and research ethics

This study has a right to protection and research ethics as all participants' voluntariness of consent to research are given. In addition, all participants' personal data are recorded in a closed record. The data are, hence, kept confidential, and there will be no disclosure of the data to the third party. One year after the completion of research, all data will be disposed.

The benefits received by the participants are that the participants will immediately receive medical service if they are diagnosed with a dementia and that the participants will get their records from the study for the self-prevention of a dementia. The researcher has submitted a requirement for research approval from the committee of research ethics regarding to human study of Nonthaburi Public Health Office, and it has been approved by the document no. 1/2563, certified at January 14, 2020 before the conduct of the study.

RESULTS

It is found that the majority of samples are females as there are 233 people (79.0%) while there are 62 males (21.0%). The average age is 70.23±6.90 years old. The average weight is 60.85±12.33 kilograms. The average height is 157.23±7.55 centimeters. The average body mass index (BMI) is 24.53±4.31 kg/m^2. Regarding to marital status, 164 people of participants are married (55.6%). The numbers of widows, unmarried people and divorcees are 67 (22.7%), 45 (15.3%) and 19 (6.4%) people, respectively. Regarding to educational levels, 166 of them hold a primary school degree (56.3%). The number of holders of a high school degree, a bachelor's degree and a diploma degree are 61 (20.7%), 33 (11.2%) and 22 (7.5%)

people respectively. 8 people of participants (2.7%) are non-graduates while 5 of them (1.7%) hold a master degree. Regarding to occupations, 103 participants are unemployed (34.9%) while 94 participants are retirees (31.9%). The number of employed participants is 52 people (17.6%) whereas the figures for those who are in a trade business and who do other occupations are 32 (10.8%) and 14 (4.8%) people respectively. Regarding to chronic diseases, 218 participants (73.9%) report that they have high blood pressure while 111 participants (37.6%) have diabetes. 159 participants (53.9%) report that they have dialysis. About alcohol consumption, 220 participants (74.6%) state that they have never drunk alcohol. 55 participants (18.6%) said that they quit drinking alcohol while 20 participants (6.8%) still drink alcohol on a regular basis. Regarding to smoking habits, 264 participants (89.5%) state that they have never smoked. 31 participants (10.5%) said that they quit smoking while none of them still smoke on a regular basis. It is reported that none of them have been addicted to drugs. Regarding to exercising habits, 176 participants (59.7%) report that they do not exercise on a regular basis whereas the other 119 participants (40.3%) state that they do. 240 participants (81.4%) report that they watch a television regularly whereas the other 55 participants (18.6%) state that they do not watch a television on a regular basis. About mobile phones, 158 participants (53.6%) use smart phones whereas the other 90 participants (30.5%) use regular mobile phones. The other 47 participants (15.9%) do not use mobile phones. Regarding to computer skills, 253 participants (85.8%) are not able to use a computer while the other 42 participants (14.2%) know how to use a computer. About the Internet usage, it is found that 175 participants (59.3%) do not know how to use the Internet while the other 120 participants (40.7%) use the Internet on a regular basis. Regarding to social participations, 221 participants (74.9%) have regular social participations, while the other 74 participants (25.1%) admitted that they rarely participate in social activities. About a dementia history in participant's family, 277 participants (93.3%) reported that they do not have any relatives who have a dementia, while the other 18 participants (6.1%) do. Regarding to religious participations, 165 participants (55.9%) participate in religious activities frequently, whereas the other 130 participants (44.1%) do not. Regarding to family types, 164 participants (55.6%) live in nucleus families, while the other 98 participants (33.2%) live in extended families. The other 33 participants (11.2%) report that they live alone. The prevalence of dementia found is 53 participants (18.0%). (Table 1)

The represents participant's educational level and dementia prevalence. It is found that 50 percent of participants who are non-graduates have a dementia. It is found that 22 percent of primary-school degree and 10 percent of high school degree holders have a dementia. The majority of participants are a primary-school degree holder. From the results retrieved from MMSE Thai 2002, the sensitivity of the group (primary-school degree holders) is lower than the group of those holding a higher degree. (Table 2)

The demonstration of the comparative analysis of sample's personal data and having dementia. It is found that there are many personal features associated with having a dementia in the elderly, as those features show the statistical significance at 0.05. Firstly, males are more associated to have a dementia than females (OR 2.07 [95%CI 1.07, 4.01]), and those who are older are more associated to have a dementia than the younger ones (OR 1.08 [1.04, 1.13]). In addition, those who hold a primary-school degree or lower are more associated to have a dementia than those whose degrees are higher than a primary-school degree (OR 6.60 [95%CI 1.24, 35.23]), and the participants with diabetes are more associated to have a dementia than those who do not have a symptom of diabetes (OR 2.36 [95%CI 1.29, 4.31]). It is also found that those who use regular mobile phones are more associated to have a dementia than those who use smart phones (OR 5.69 [95%CI 2.59, 12.53]), and an inability in using computers is more associated to have a dementia than a keen ability in using computers (OR 10.61 [95%CI 1.43, 78.93]). Similarly, an inability in using the Internet is more associated to have a dementia than a keen ability in using the Internet (OR4.14 [95%CI 1.94, 8.86]), and infrequent social participations are more associated to have a dementia than frequent participations (OR 2.11 [95%CI 1.21, 3.97]). Last but not least, infrequent religious participations are more associated to have a dementia than frequent participations (OR 2.24 [(95%CI 1.22, 4.11]). Meanwhile, it is found that many personal features, including weight, height, body mass index (BMI), marital status, occupations, chronic diseases (high blood pressure and dialysis), regular medications, alcohol consumption, habits (smoking, exercising, watching TV) and family types, are not associated with having a dementia in the elderly due to the low statistical significance ($p>0.05$). Nevertheless, as none of the samples have family history related to a dementia, this cannot be applied to calculate in the statistics. (Table 3)

The multivariate analysis is applied to analyze personal features associated with dementia in the elderly who live in Bang Kruai Sub-District, Bang Kruai District,

TABLE 1. General Demographic Information (N=295).

	Number	Percentage
Sex		
Male	62	21.0
Female	233	79.0
Age (year old), mean±SD	70.23±6.90	
Body weight (kg.), mean±SD	60.85±12.33	
Height (cm.), mean±SD	157.23±7.55	
BMI (kg/m^2), mean±SD	24.53±4.31	
Marital Status		
Single	45	15.3
Married	164	55.6
Widow	67	22.7
Separated	19	6.4
Educational level		
No education	8	2.7
Primary school	166	56.3
Secondary school	61	20.7
Diploma	22	7.5
Bachelor degree	33	11.2
Master degree	5	1.7
Occupation		
Unemployed	103	34.9
Retried	94	31.9
Employment	52	17.6
Trade	32	10.8
Other	14	4.8
Comorbility		
Hypertension	218	73.9
Diabetes	111	37.6
DLP	159	53.9
Drug use	264	89.5
Alcohol consumption		
Regularly	20	6.8
Stopped	55	18.6
Never	220	74.6
Smoking		
Stopped	31	10.5
Never	264	89.5
Caffeine intake		
Regularly	176	59.7
Stopped	16	5.4
Never	103	34.9
Substant		
Never	295	100.0

TABLE 1. General Demographic Information (N=295). (continue)

	Number	Percentage
Exercise		
Regularly	119	40.3
Sometime	176	59.7
Television uses		
Regularly	240	81.4
Sometime	55	18.6
Mobile uses		
Never	47	15.9
Classic version	90	30.5
Smart phone	158	53.6
Computer skill		
Yes	42	14.2
No	253	85.8
Internet Skill		
Yes	120	40.7
No	175	59.3
Social Participation		
Regularly	221	74.9
Sometime	74	25.1
Family history of dementia		
Yes	18	6.1
No	277	93.9
Participating in religious activities		
Normally	165	55.9
Sometime	130	44.1
Family Type		
Nuclear Family	164	55.6
Extended Family	98	33.2
Alone	33	11.2
Dementia present		
Yes	53	18.0
None	242	82.0

TABLE 2. Dementia separated by Educational level.

Educational Level	MMSE Score	Dementia present (n=53)	Dementia absent (n=242)
None	< 14	4 (7.5)	4 (1.7)
Primary school	< 17	37 (69.8)	130 (53.7)
Higher primary school	< 22	12 (22.7)	108 (44.6)

TABLE 3. The analysis for comparing the general information with dementia.

	Dementia presented (n=53)	Dementia absented (n=242)	Odds ratio (95%CI)	p-value
Sex				
Male	17 (32.1)	45 (18.6)	2.07 (1.07, 4.01)	<0.05*
Female	36 (67.9)	197 (81.4)	ref.	
Age (Years)	73.45±6.42	69.52±6.82	1.08 (1.04, 1.13)	<0.001*
Body weight (kg)	61.83±14.00	60.63±11.95	1.01 (0.98, 1.03)	0.523
Height (cm.)	157.66±9.87	157.14±6.96	1.01 (0.97, 1.05)	0.715
BMI (kg/m^2)	14.87±3.42	24.15±3.39	1.02 (0.95, 1.09)	0.623
Marital Status				
Single	9 (17.0)	36 (14.9)	ref.	
Married	27 (50.9)	137 (56.6)	1.06 (0.41, 2.70)	0.908
Widow	14 (26.4)	53 (21.9)	0.79 (0.34, 1.83)	0.578
Separated	3 (5.7)	16 (6.6)	0.75 (0.18, 3.14)	0.694
Educational level				
No education	4 (7.5)	4 (1.7)	6.60 (1.24, 35.23)	<0.05*
Primary school	37 (69.8)	129 (53.3)	1.89 (0.69, 5.19)	0.215
Secondary school	6 (11.3)	55 (22.7)	0.72 (0.21, 2.55)	0.610
Diploma	1 (1.9)	21 (8.7)	0.31 (0.03, 2.88)	0.306
BSC or Over	5 (9.4)	33 (13.7)	ref.	
Occupation				
Unemployed	21 (39.6)	82 (33.9)	ref.	
Retried	16 (30.2)	78 (32.2)	0.80 (0.39, 1.65)	0.546
Employed	8 (15.1)	44 (18.2)	0.71 (0.29, 1.73)	0.452
Trade	4 (7.5)	28 (11.6)	0.56 (0.18, 1.77)	0.321
Other	4 (7.5)	10 (4.1)	1.56 (0.45, 5.48)	0.486
Comorbidity				
Hypertension	43 (81.1)	175 (72.3)	1.65 (0.78, 3.46)	0.189
Diabetes	29 (54.7)	82 (33.9)	2.36 (1.29, 4.31)	<0.05*
DLP	30 (56.6)	129 (53.3)	1.14 (0.63, 2.08)	0.663
Drug adherence	49 (92.5)	215 (88.80	1.54 (0.52, 4.59)	0.441
Alcohol consumption				
Regularly	4 (7.5)	16 (6.6)	1.32 (0.42, 4.19)	0.636
Stopped	14 (26.4)	41 (16.9)	1.81 (0.89, 3.66)	0.101
Never	35 (66.0)	185 (76.4)	ref.	
Smoking				
Stopped	6 (11.3)	25 (10.3)	1.11 (0.43, 2.85)	0.831
Never	47 (88.7)	217 (89.7)	ref.	
Caffeine intake				
Regularly	30 (56.6)	146 (60.3)	0.76 (0.41, 1.40)	0.373
Stopped	1 (1.9)	15 (6.2)	0.25 (0.03, 1.96)	0.185
Never	22 (41.5)	81 (33.5)	ref.	

TABLE 3. The analysis for comparing the general information with dementia. (continue)

	Dementia presented (n=53)	Dementia absented (n=242)	Odds ratio (95%CI)	p-value
Substant				
Never	53 (100.0)	242 (100.0)	-	-
Exercise				
Regularly	20 (37.7)	99 (40.9)	ref.	
Sometime	33 (62.3)	143 (59.1)	1.14 (0.62, 2.11)	0.670
Television uses				
Regularly	40 (75.5)	200 (82.6)	ref.	
Sometime	13 (24.5)	42 (17.4)	1.55 (0.76, 3.14)	0.227
Mobile uses				
Never	18 (34.0)	29 (12.0)	9.19 (3.85, 21.92)	<0.001*
Classic version	25 (47.2)	65 (26.9)	5.69 (2.59, 12.53)	<0.001*
Smart phone	10 (18.9)	148 (61.2)	ref.	
Computer skill				
Yes	1 (1.9)	41 (16.9)	ref.	
No	52 (98.1)	201 (83.1)	10.61 (1.43, 78.93)	<0.05*
Internet skill				
Yes	9 (17.0)	111 (45.9)	ref.	
No	44 (83.0)	131 (54.1)	4.14 (1.94, 8.86)	<0.001*
Social Participation				
Regularly	33 (62.3)	188 (77.7)	ref.	
Sometime	20 (37.7)	54 (22.3)	2.11 (1.21, 3.97)	<0.05*
Family history of dementia				
Yes	0 (0.0)	18 (7.4)	ref.	
No	53 (100.0)	224 (92.6)	NA	NA
Participating in religious activities				
Normally	21 (39.6)	144 (59.5)	ref.	
Sometime	32 (60.4)	98 (40.5)	2.24 (1.22, 4.11)	<0.05*
Family Type				
Nuclear Family	30 (56.6)	134 (55.4)	1.62 (0.53, 4.96)	0.396
Extended Family	19 (35.8)	79 (32.6)	1.74 (0.55, 5.56)	0.347
Alone	4 (7.5)	29 (12.0)	ref.	
MMSE score	14.87±3.42	24.15±3.39	0.51 (0.42, 0.62)	<0.001*

* Significant level at 0.05 <NA: cannot present in Odds ratio because some variable n=0>

Nonthaburi Province. The multiple regression analysis (a stepwise method) is applied to analyze variables with the statistical significance at 0.05, calculated by the univariate analysis. As presented in Table 3, the predictor variables are gender, age, educational level, having diabetes as a chronic disease, social participations, having relatives who have a dementia and religious participations. From the results of the analysis, there are seven steps of prototypes. In a section of the study results, only the analysis results of the 7th step, or the last step in the stepwise method, will be demonstrated. (Table 4)

The illustration of the multiple linear regression between predictor variables and dementia from an assessment in MMSE-Thai 2002 in the last step (the 7th step). It is found that personal features, including a primary-school degree, non-graduate, an ability in using computers and internet, age and having relatives who have a dementia, are associated factors predicting of a dementia in the elderly who live in Bang Kruai Sub-District, Bang Kruai District, Nonthaburi Province (the statistical significance: $p < 0.05$). According to MMSE-Thai 2002, it is found that the most associated factor is a primary-school degree, following by non-graduate, an ability in using computers and internet, age and having relatives who have a dementia respectively. The regression coefficient (β) are -0.345, -0.288, 0.170, 0.131, 0.128, -0.114 and 0.095 respectively. By based on MMSE-Thai 2002, the factors, including a primary-school degree and an age, show negative correlations with having a dementia, while the other factors, including abilities in using computers, internet and mobile phones, age as well as having relatives who have a dementia show positive correlations with having a dementia. These seven factors show the regression coefficient at 0.659, and the statistical significance at 0.05 ($p=0.035$). The success of MMSE-Thai 2002 in predicting a dementia in the elderly is at 43.5 percent, and the predicting error is ±3.75. Meanwhile, the factors, including gender, social and religious participations do not statistically affect having a dementia in the elderly who live in Bang Kruai Sub-District, Bang Kruai District, Nonthaburi Province. (Table 5)

TABLE 4. The testing of relation between predictor factors and Dementia was evaluated by MMSE-Thai 2002.

Model	Sum of squares	df	Mean Square	F	p-value
Regression	3098.640	7	442.663	31.517	<0.001*
Residual	4031.008	287	14.045		
Total	7129.647	294			

* Significant level at 0.05

TABLE 5. The Relation between Predictor factors and Dementia was evaluated by MMSE-Thai 2002.

Model	Unstandardized B	Coefficients SE	Standardized coefficients Beta	t	p-value
Educational level					
Primary level	-3.422	.490	-.345	-6.986	<0.001*
No education	-8.720	1.389	-.288	-6.277	<0.001*
Internet skill	1.314	.540	.131	2.434	0.016*
Computer skill	2.393	.720	.170	3.324	0.001*
Mobile Phone	1.725	.652	.128	2.647	0.009*
Age	-0.082	.035	-.114	-2.354	0.019*
Family history of dementia	1.942	.919	.095	2.114	0.035*

$R = 0.659$, $R^2 = 0.435$, Adj. $R^2 = 0.421$, SE est = 3.748, F change 4.467, p-value = 0.035

*Significant level at 0.05

DISCUSSION

Prevalence of dementia

The prevalence of dementia is 18 percent, this corresponds with the study of Artithaya Suwan and Suttisri Trakulsittichok[6] indicated that the prevalence of dementia in the elderly is 18.6 percent. The prevalence of these two studies is similar owing to the similarity of the research design, the use of the same tools and the use of a primary medical center as a study area. The difference between the two researches is that this study is more active in accessing the participants. However, since both communities in the studies are urbanized, the access to medical centers, especially primary ones, is quite convenient. The prevalence of dementia in this study is also similar to those in Japan[9] and Brazil[10], where the prevalence was 15.7% and 16.9%, respectively. A key factor that may differentiate the prevalence of dementia with this study is the difference in social factors of each country, such as the educational status or the elderly participation in social activities.

Nevertheless, several studies show the considerable different results of the prevalence. The study in Lampang province[8] found the prevalence of dementia equal to 28 percent and the study in rural northeastern region[11] found the prevalence of dementia was 25.6 percent. According to the data, it is found that population in these studies are from the rural areas which have low educational level, so this lead to the higher prevalence.

In conclusion, from the literature review, it is found that the prevalence rate of dementia varies significantly due to the differences in methodology, population feature, sampling size, population's age, study area, and criteria and tools chosen for the diagnosis of a dementia.

Associated factors

Gender: from the study, it is found that the number of male participants who have dementia is significantly higher than the females. This does not correspond with other studies. After reviewing the study, it is found that most participants are female, and the proportion of male participants is only 21 percent. Due to the small data of male participants, this may result in some errors. **Age:** the study indicates that the average age of participants with dementia is higher than that of those who do not suffer from dementia. This corresponds with all other studies and the disease theory, as this disease results from the age degeneration. Those who are older, then, are more likely to have dementia. **Educational Level:** the study indicates that non-graduates and primary-degree holders are more likely to have dementia than those who obtain high school-degree or higher. This corresponds with the previous studies.[6,8,11,12] The results do not contradict with any studies, so it can be concluded that the lower educational levels might be a cause of dementia in the elderly. **Having diabetes as a chronic disease:** the study indicates that those with diabetes are more likely to have dementia than those without. This corresponds with the study of Lalita Panakorn et al.[7] The correspondence might be explained by the fact that patients with unwell-controlled diabetes tend to have serious complications, and this can cause them a state of confusion, which can be related to dementia. **The usage of mobile phones, computer and the internet:** the study indicates that those who are skilled at using mobile phones, computer and the internet are less likely to have dementia than those who are unskilled. However, since the results are unprecedented, the conclusion cannot be reached owing to a lack of data. Still, it cannot explain that technology can prevent people from having dementia owing to the study limitations. **Social and religious participations:** the study indicates that people who regularly participate in social and religious actives are less likely to have dementia than those who do not. This corresponds with the previous studies.[7,8,12] The results do not contradict with any studies, so it can be concluded that the infrequent social and religious participations might be a cause of dementia in the elderly. **The other factors** in the study do not seem to have a significant association with dementia. However, the results do not correspond with other studies, as this study shows no associations between Body Mass Index (BMI) and dementia. From Artithaya Suwan[6], it is found that lower BMI can be associated with dementia. After the literature is reviewed, the average of BMI of samples in this study is higher than the study of Artithaya Suwan and Suttisri Trakulsittichok, so this might lead to dissimilar results. In addition, this study shows no associations between regular exercise habits and dementia. From Artithaya Suwan[6], it is found that the absence of exercise can be associated with dementia. After reviewing literature, it is found that the participants of this study can choose whether they "exercise regularly" or not whereas "never exercise" and "rarely exercise" are the options that the participants in the study of Artithaya Suwan and Suttisri Trakulsittichok can also choose. This, consequently, might lead to dissimilar results. Additionally, this study shows no associations between smoking habits and dementia, and this does not correspond with the study of Lalita Panakorn et al.[7] After reviewing literature, it is found that none of participants in this study are a current smoker, so there is only a comparative study between non-smokers and ex-smokers. This might result

in the differences of the results. Furthermore, this study shows no associations between the employment and dementia. From Lalita Panakorn et al[7], it is found that those who are currently unemployed can be associated with dementia. After reviewing literature, the samples of this study are living in the urbanized areas, so it might be convenient for them to have social gatherings and activities frequently. Meanwhile, the samples of Lalita Panakorn et al's study[7] are living in the rural areas, so it might be more challenging for them to have social gatherings owing to the difficulties in commuting. This also might lead to the differences of the results.

One of the advantages of this study is that there is a use of active study to examine the elderly in the community. This, consequently, leads to an easy access towards participants. Since the educational levels of the residents in this community greatly vary, the tools in this study are divided into different educational categories. Also, the researcher assessed and interviewed all participants by herself to reduce differences of scoring criteria. However, one of the limitations of this study is that the sensitivity and specificity of assessment tools are different according to the educational levels. As most of the participants hold a primary school-degree, the sensitivity and specificity significantly decrease. Moreover, as this is a cross-sectional study, it is unable to identify risk factors, but it can only determine the connections between dementia and the associated factors.

CONCLUSION

Dementia is one of the most common condition in elderly. Therefore, primary care doctors are recommended to be concerned and implement a dementia screening in primary care unit because the evidence of study shows that dementia's prevalence is as high as 18% or approximately 1 of 5 in the elderly population.

In particular, screening in the elderly with the following characteristics: male sex, high age, low education level, diabetes mellitus, no mobile phone, no computer skill, no internet skill, rarely social participation and rarely religion participation. Because there are supporting data that these factors are significantly associated with dementia.

Suggestions

Dementia is one of the crucial public's health problems, especially in the community of elderly people since the number of patients with this disease consistently increases with the rise of the population's ages. This can cost an enormous amount of money in receiving medical service. Therefore, the efficiency of the disease prevention and the health promotion is significant as it can reduce the disease opportunities and assist in identifying a patient at an earlier stage. This could help patients to lead better lives and receive medical service as rapidly as possible. The findings indicate that the prevalence of dementia in the 60-year and older residents living in Bang Kruai Sub-District, Bang Kruai District, Nonthaburi Province is 18 percent. This demonstrates that the number of elderly with dementia in the community is considerable, and the medical officers should be aware of this disease, especially in those with extremely high ages, lower educational levels, health issues which may affect their social and religious participations, as well as difficulties in learning how to use technology. Moreover, it is advisable to encourage the elderly, who do not show a symptom of dementia, to regularly participate in social and religious gatherings, and they should be encouraged to learn how to use recent technology as well.

The limitation of this study is that the researcher is not able to unsupervised diagnose a dementia by using DSM IV criteria, so an assessment tool, such as MMSE Thai 2002, is applied instead. However, the sensitivity and specificity of this tool can decrease when the educational levels of participants are at a primary-school degree or lower. Thus, the use of more efficient tools can lead to a better study result. In addition, there might be an issue regarding recall bias or under report from the participants as the direct interview is applied in this study without any use of participant's previous medical records or data. This can result in errors deriving from wrong recollections or understanding of the researcher.

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